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GAIT3D User's Manual

Version 1.0

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CONTENTS

1. Introduction

About Gait3D_v1

Gait3D is a three-dimensional motion analysis program developed for the U.S. Army Research Institute of Environmental Medicine (USARIEM). The current version is V1.0. It supports the test setup of USARIEM motion analysis system with one force plate and fourteen markers.

Gait3D allows running, visualizing and analyzing multiple gait tests in a simple graphical layout. It uses the inverse dynamics and graphical routines developed by Shen and Stuhmiller [1] and can be customized for various test setups.

Features

♦ Input and output file formats are compatible with the current USARIEM gait program

♦ Supports running multiple tests in one project

♦ Provides easy control of analysis parameters

♦ StickViewer allows the visualization of each test

♦ XYViewer allows the study of test results inside the program

Installation

To install Gait3D_v1, run the ***install_gait3d_v1.exe*** program comes with this manual. Follow the directions in the installation window. Enter the name of the directory where Gait3D_v1 to be installed (***$gait3dpath***) when asked for. The installation program will automatically generate shortcuts under ***window startup/program*** menu and on the desktop.

To uninstall Gait3D_v1, run the ***unwise.exe*** program under the ***$gait3dpath*** directory. Some files in the directory may need removing manually.

Start Gait3D_v1

Gait3D_v1 can be run from shortcuts under ***window startup/program*** menu and on the desktop.

---

[1] Shen, W. and J. H. Stuhmiller (2000), "Articulated Human Biomechanical Modeling Toolbox, Phase I Report"

2. Program Layout

Window Convention

- ◆ Window Color: the color scheme in Gait3D_v1 is the same as the default window color

- ◆ Window icons: each window or popup window has three buttons at the top right corner. Clicking the left icon will minimize the window; clicking the middle one will maximize the window; while clicking the right one will destroys the window

- ◆ Resize windows or panels: most graphical components in Gait3D_v1 can be resized. At the cornet of certain windows, there are areas that can be pulled to increase or decrease the size of the window. For window comes with more than one view areas (***Project Editing and Test Editing Panel, Help Panel***, etc.), the vertical or horizontal bar separating the view areas can be dragged to change the size of each view area.

- ◆ Disabled GUI components: Gait3D_v1 will automatically enable or disable some GUI components during its execution.

GUI components

Title bar

When a project is open, project name will be displayed on the **Title bar**

`⨍ GAIT PROGRAM: [D:\GaitProgram\Version1\Example\Proj1\sample.proj]  ▬ ◻ ✕`

Project Menu

Project Menu performs operations on a project, such as creating a new project; opening an existing project; saving as another project; closing a project; running the project, as well as exiting the Gait3D_v1 program.

```
♪ GAIT PROGRAM:
Project  Test  View
    New Project
    Open Project
    Save as Project
    Close Project

    Run Project

    Exit
```
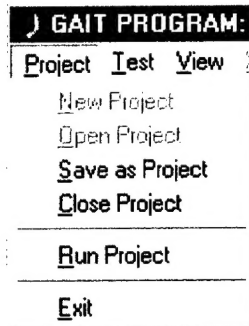
Test Menu

Test Menu performs basic operation on a test, such as adding; importing; or deleting a test to or from the project; changing the sequence of the tests in the project; as well as changing the default test setting.

```
Test  View  XYViewer
    Add
    Import
    Move up
    Move down
    Delete

    Default test setting
```
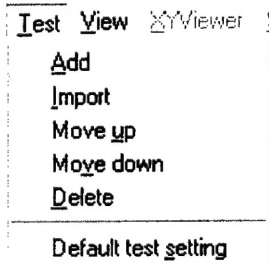
View Menu

View Menu switches between different view panels. The displayed view panel will be "checked on".

```
View  XYViewer  St
✔ Project Editor
    XY Viewer
    Stick Viewer
    Message
    Help
```

Toolbar

The **Toolbar** provides easy ways of switching between different view panels as well as running a project.

Switch on/off
Project/Test
Edit Panel

Switch on/off
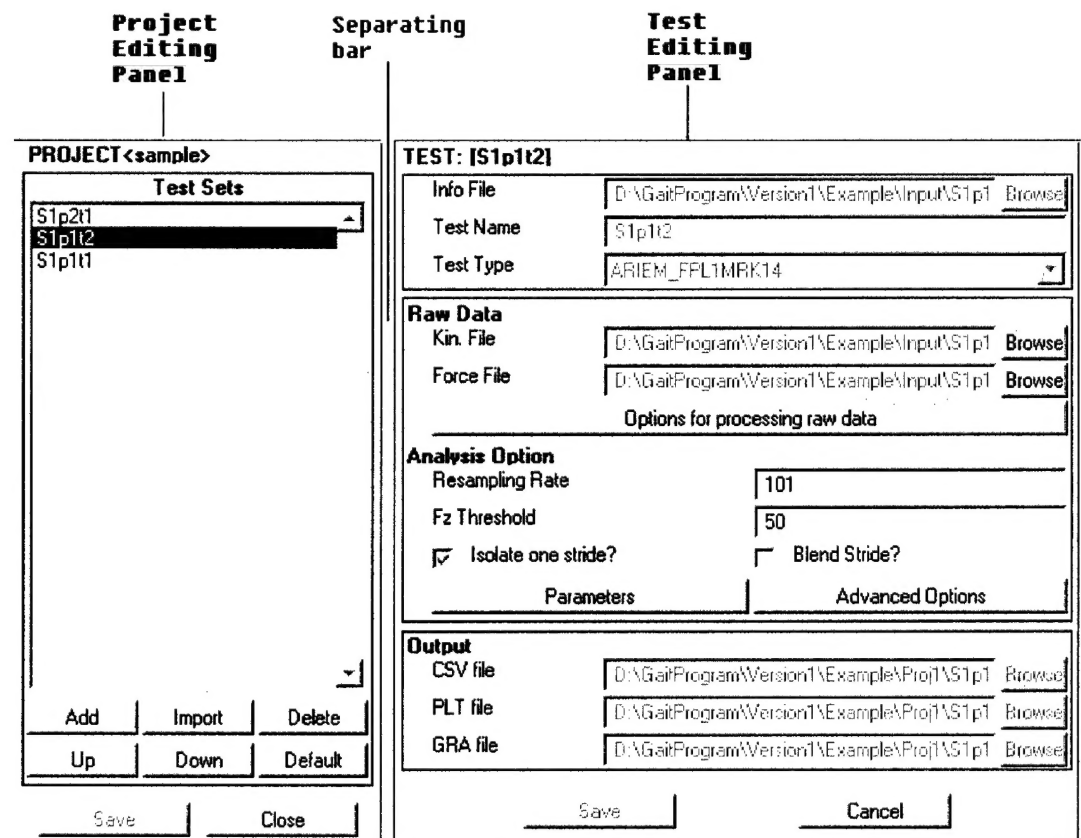XYViewer Panel

Switch on/off
message panel

📄 Project ➡ Analyze 🖼 XYview 🧍 Sticks ⊙ Message ❷ Help

Run analysis of
the project.
Enabled only when
the project has
been saved

Swtch on/off
StickViewer Panel

Switch on/off
Help Panel
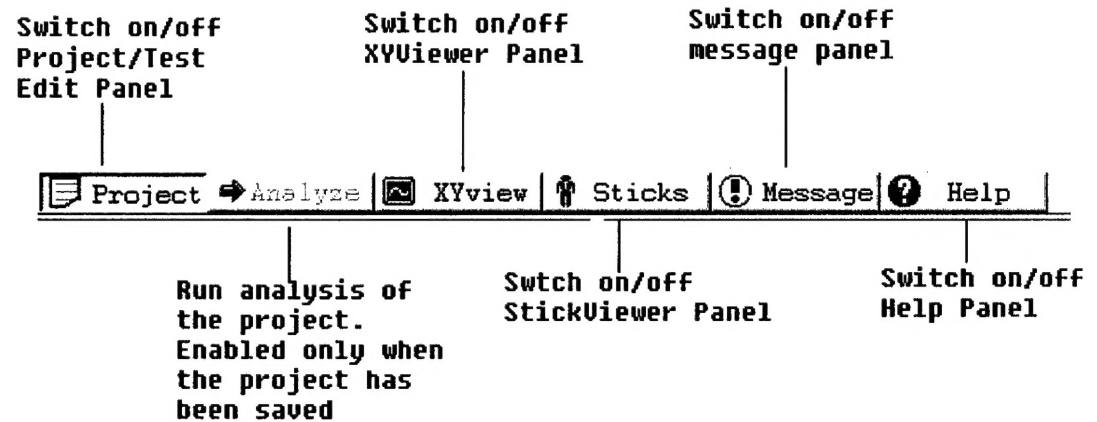
Project and Test Editing Panels

Project and Test Editing Panels can be activated by selecting **Project** from **View Menu** or by clicking the **Project** icon on the **Toolbar.**

Project
Editing
Panel

Separating
bar

Test
Editing
Panel

PROJECT<sample>

Test Sets

S1p2t1
S1p1t2
S1p1t1

| Add | Import | Delete |
| Up | Down | Default |

Save | Close

TEST: [S1p1t2]

Info File   D:\GaitProgram\Version1\Example\Input\S1p1 Browse
Test Name   S1p1t2
Test Type   ARIEM_FPL1MRK14

Raw Data
Kin. File   D:\GaitProgram\Version1\Example\Input\S1p1 Browse
Force File   D:\GaitProgram\Version1\Example\Input\S1p1 Browse
Options for processing raw data

Analysis Option
Resampling Rate   101
Fz Threshold   50
☑ Isolate one stride?   ☐ Blend Stride?
Parameters   Advanced Options

Output
CSV file   D:\GaitProgram\Version1\Example\Proj1\S1p1 Browse
PLT file   D:\GaitProgram\Version1\Example\Proj1\S1p1 Browse
GRA file   D:\GaitProgram\Version1\Example\Proj1\S1p1 Browse

Save | Cancel

Project Editing Panel contains a listbox listing all tests in the project; an **Add** button to add a test to the project; an **Import** button to import a test into the project; a **Delete** button to remove a test from the project; an **Up** and a **Down** button to change the sequence of tests in the project; and a **Default** button to change the default test setting. It also contains a **Save** and a **Close** button to save the changes to the project and to close the project.

Test Editing Panel contains GUI items associated with specifying a test. It also contains a **Save** and a **Cancel** button to save or discard the changes to the test.

The separating bar between **Project Editing Panel** and **Test Editing Panel** can be dragged to change their sizes.

XYViewer

XYViewer is activated by selecting **XYViewer** from **View Menu** or by clicking the **XYViewer** icon on the **Toolbar.**
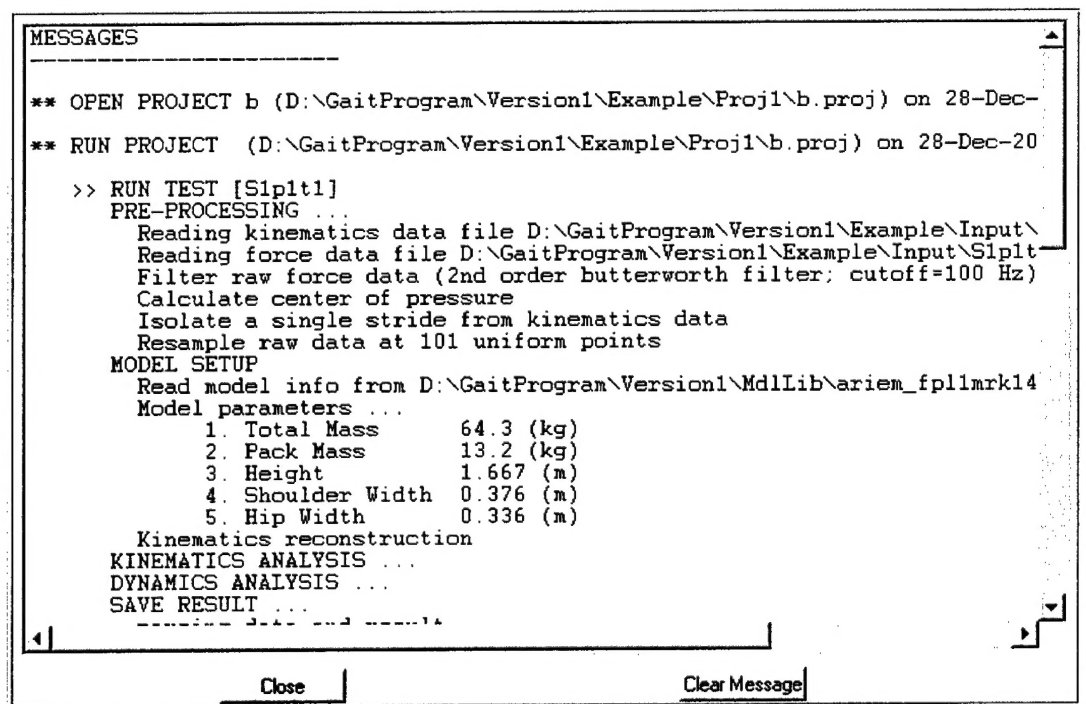
Refer to section 4 for more information on XYViewer.

StickerViewer

StickerViewer is activated by selecting Sticker**Viewer** from **View Menu** or by clicking the Sticker**Viewer** icon on the **Toolbar.**

Refer to section 5 for more information on StickerViewer.

Message View Panel

```
MESSAGES                                                                    ▲
----------------------

** OPEN PROJECT b (D:\GaitProgram\Version1\Example\Proj1\b.proj) on 28-Dec-

** RUN PROJECT  (D:\GaitProgram\Version1\Example\Proj1\b.proj) on 28-Dec-20

  >> RUN TEST [S1p1t1]
     PRE-PROCESSING ...
        Reading kinematics data file D:\GaitProgram\Version1\Example\Input\
        Reading force data file D:\GaitProgram\Version1\Example\Input\S1p1t
        Filter raw force data (2nd order butterworth filter; cutoff=100 Hz)
        Calculate center of pressure
        Isolate a single stride from kinematics data
        Resample raw data at 101 uniform points
     MODEL SETUP
        Read model info from D:\GaitProgram\Version1\MdlLib\ariem_fpl1mrk14
        Model parameters ...
             1. Total Mass        64.3 (kg)
             2. Pack Mass         13.2 (kg)
             3. Height            1.667 (m)
             4. Shoulder Width    0.376 (m)
             5. Hip Width         0.336 (m)
        Kinematics reconstruction
     KINEMATICS ANALYSIS ...
     DYNAMICS ANALYSIS ...
     SAVE RESULT ...
                                                                           ▼
◄|                                                                      |►
```

| Close | | Clear Message |

Message View Panel is activated by selecting **Message** from **View Menu** or by clicking the **Message** icon on the **Toolbar.**

Message View Panel displays information regarding to the project and test operations.

Help View Panel

Help View Panel is accessed by selecting **Help** from **View Menu** or by clicking the **Help** icon on the **Toolbar.**

Help View Panel lists topics regarding Gait3d_v1. Click on a topic to view the contents of the topic in the content listbox. A **+** or a **-** to the left of a topic indicates subtopics are present under the topic. Double clicking on the topic will display or hide the subtopics.

The separating bar between **Topic window** and **Content window** can be dragged to change their sizes.

2
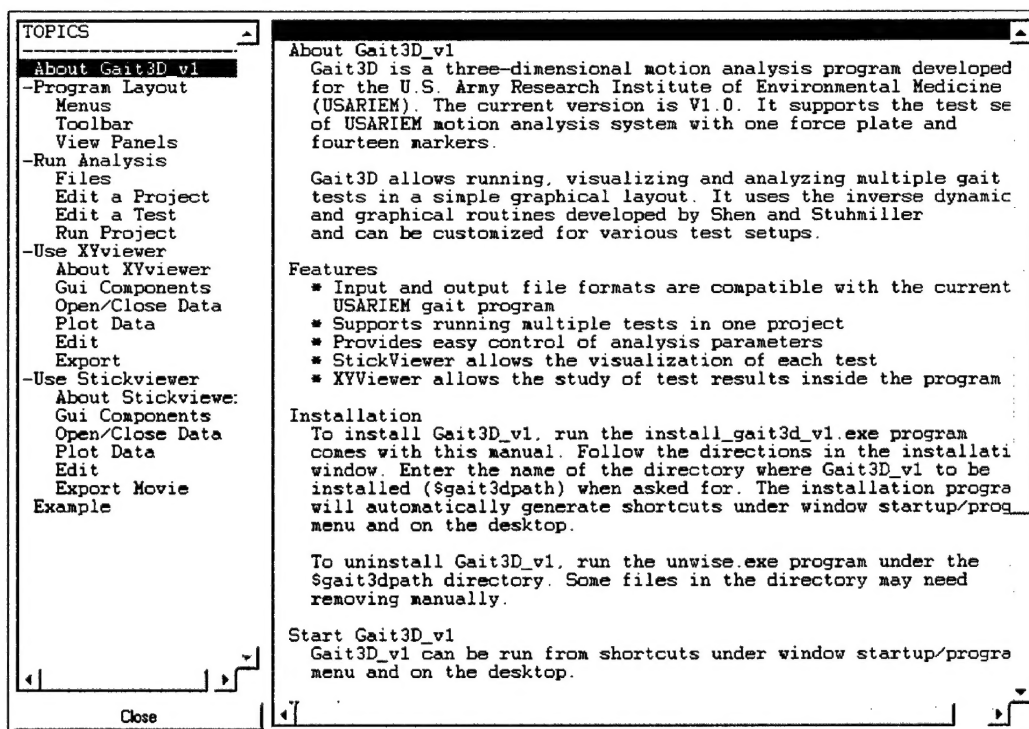
3. Run Analysis

File Associated with a Project

Project file (*.proj)

A project file is a binary file stores all information regarding a project. A project file always has the name of **projname.proj**, where **projname** indicates the name of the project.

Message file (*.msg)

A message file is an ASCII file with the name of **projname.msg** in the same directory as the project file. It records all operations performed on the project, including those performed during previous use of Gait3d_v1. This file has to be removed manually when not needed or become too large.

Output file (*.output)

After a project is run, an ASCII file named **projname.output** will be generated automatically in the same directory as the project file. It contains detailed information on each test being analyzed.

Default test setting file (test.default)

When a new project is created, Gait3D_v1 will automatically create the file **test.default** in the same directory as the project file. This file records the default test setting associated with the projects in the directory. It will be updated when default test setting is changed in Gait3D_v1.

File Associated with a Test

The two-dimensional test setup of USARIEM motion analysis system with one force plate and fourteen markers, labeled as **ARIEM_FPL1MRK14**, is currently supported. Files associated with this kind of test are listed as follow.

Input files

Two input files: **testname.vid** and **testname.tad** are required for a test. These files are output from USARIEM motion system. They should have the same name (except for different file extensions) and be in the same directory. The format for these files, as described by previous USARIEM gait software manual, is given as follows

testname.vid is the video "marker" file that contains 3D coordinates. It is expected to contain 60 columns of data (20 3D markers). Columns filled with zeros represent unused markers. If the number of markers is odd, the 13th marker is assumed to be from the pack, with "extra" markers beginning with marker #14. Otherwise, a no-pack condition is detected and extra markers begin with marker #13. Thus extra markers must be added only in multiples of two.

The total body center of gravity (CG) data always fills the last three columns of the marker output file, or in some cases, a copy of hip data is used to substitute total body CG.

testname.tad is the force plate file that contains the measured ground reaction force and EMG signals when present.

Test info file

When a test is created or edited in Gait3D_v1, a test info file *testname.info* will automatically be created in the same directory as the test input files. It is file is only for saving the test information, which can be input into other projects when necessary.

Table 3-1. Test information saved in a test info file

	Sampling rate of motion capture system
Motion Data	Filter type and cutoff frequency for raw marker data
	File name of the *.vid file
	Sampling rate of motion capture system
	Filter type and cutoff frequency for raw marker data
Force Plate/EMG data	File name of the *.tad file
	Number of pre-trigger samples. This is used to remove the initial data shift of the force plate
	Total mass
	Pack mass
Parameter	Subject height
	Subject hip width
	Subject shoulder width

Result Files

Three result files will be created in the same directory as the project file for each test when a project has been analyzed.

testname.grf is an ASCII spread sheet file containing the time history of all results. This file follows exactly the same format as the output file format of the previous USAREIM gait software.

testname.plt is an binary result file containing the time history of all results. This file can be opened by XYViewer in Gait3D.

testname.gra is an binary result file for creating stick plot. This file can be opened by StickViewer in Gait3D.

Edit a Project

Create a new project

◆ Select **New Project** from **Project Menu**

◆ Browse for or enter the name of the new project

After a new project is created, Gait3D automatically switches to **Project and Test Editing Panels**

Open an existing project

◆ Select **Open Project** from **Project Menu**

◆ Browse for the project to be opened

After the projected is opened, Gait3D automatically switches to **Project and Test Editing Panels.**

Save the current project as a new project

◆ Select **Save as Project** from **Project Menu**

◆ Browse for or enter the name of the new project

Close the project

◆ Select **Close Project** from **Project Menu**

  Or click on **Close** button on **Project Editing Panel**

After a project is closed, Gait3D automatically switches to **Message Panel.**

Save changes to the project

◆ Click on **Save** button on **Project Editing Panel**

Gait3D_v1 can automatically detect if changes have been made to the current project. If no change has been made, the **Save** button is disabled.

Add a new test to the project

♦ Click on **Add** button on **Project Editing Panel**

♦ In the popup window, browse and select the motion data file associated with this test.

♦ The **Project Editing Panel** will be "locked", and the **Test Editing Panel** will be update to show the default value for the new test

♦ Edit the test (see below on **Editing a test**) and click **Save** button on the **Test Editing Panel** to add the test to the project

Or click **Cancel** on the **Test Editing Panel** to abort adding the test.

Note: The new test will use the default test setting. In order to let all new test to have the desired default value, edit the default test setting first.

Import a test to the project

♦ Click on **Import** button on **Project Editing Panel**

♦ In the popup window, browse and select the test info file associated with the test to be input.

Note: Only the test information as specified in Table 3-1 will be imported. The remaining test data will use the values in the default test setting.

Remove a test from the project

♦ Select the test in the **Test listbox** on **Project Editing Panel**

♦ Click **Delete** button on **Project Editing Panel**

Change the sequence of tests in the project

♦ Select a test in the **Test listbox** on **Project Editing Panel**

♦ Click **Up** or **Down** button on **Project Editing Panel** to move the test up or down

Change the default test setting

♦ Click **Default** button

♦ The **Project Editing Panel** will be "locked", and the **Test Editing Panel** will be update to show the current default setting

♦ Edit the default value (refer below on **Editing a test**) and click **Update default** button on the **Test Editing Panel** to change the test default setting

Or click **Cancel** on the **Test Editing Panel** to abort the change.

Edit a test (ARIEM_FPL1MRK14 type)

Select a test

Click on a test in the **Test Listbox** in the **Project Editing Panel** will display information related to the test in the **Test Editing Panel** and allows it to be edited.

Changes to a test

When any change is made to a test, the **Project Editing Panel** will be "locked". **Project Editing Panel** can only be released after the changes have been saved (click on **Save** button in **Test Editing Panel**) or is discarded (click on **Cancel** button in **Test Editing Panel**).

Note: An unsaved test is indicated by an * after test name in the **Test Editing Panel**

Edit Test information

Table 3-2. Basic test information (saved in a test info file)

Item	GUI to edit the item	Default Value
Sampling rate of motion capture system	**Options to process raw data** button	60
Filter type and cutoff frequency for raw marker data		2nd order butterworth;0
File name of the *.vid file	**Browse** button	N/A
Sampling rate of force plate data	**Options to process raw data** button	1000
Filter type and cutoff frequency force data		2nd order butterworth;100
File name of the *.tad file	**Browse**	N/A
Number of pre-trigger samples. This is used to remove the initial data shift of the force plate	**Options to process raw data** button	100
Total mass		70
Pack mass		15
Subject height	**Parameters** button	1.8
Subject hip width		0.336
Subject shoulder width		0.376

Table 3-3. Analysis related test information

Item	GUI to edit the item	Default Value
Test type	Disabled	ARIEM_FPL1M RK14
Re-sampling rate (for analysis and output)	**Resample Rate** box	101
Threshold for vertical ground reaction force	**Fz threshold** box	50 (N)
Whether isolate one stride from test data	disabled	Always on
Whether blend the start and end of a stride	**Blend stride** check box	off
Output grf file name	disabled	testname.grf
Output plt file name	disabled	testname.plt
Output gra file name	disabled	testname.gra
Gravity vector	**Advanced Option** button	0 0 -9.8037
Various filter type and cutoff frequency for kinematics analysis	**Advanced Option** button	2nd order butterworth;10

Run a Project

♦ Select **Run Project** from **Project Menu**

Or click the **Analyze** icon on **Toolbar**

♦ Gait3D_v1 will automatically switch to **Message View**

♦ The project will start running with an popup window indicating the progressing of the project

Note: A project must be saved before it can be run. An unsaved project is indicated by an * after project name in the **Title bar**

4. XY Plot Viewer

About XYViewer

What is XY plot viewer

XYViewer is graphical viewer to visualize the vectors or matrices stored in JIF ASCII files or STDMAT binary files.

Features

♦ Support STDMAT and JIF ASCII file formats, where the value of each "channel" of data is stored in a column vector and associated with a *name*, *label*, *units*. In STDMAT files, the data channels can also be grouped under different *group names*;

♦ Multiple data files can be opened in the same viewer. This allows the comparison of data from different files;

♦ Support printing the plot as PS, EPS, EMF, and BITMAP files;

♦ Support outputing plot data as space, tab or comma delimited ASCII files;

♦ A simple GUI layout allows the easy access and plotting of data;

♦ Support overlay of curves on a single plot;

♦ Easy access to data definition and peak values;

♦ Many axis properties, such as color, grid, box, legend, axis label, title, can be edited;

♦ Many line properties ,such as style, width, color, marker and marker size, can be edited;

♦ Automatically synchronized with additional data viewer, such as **stickViewer**, to visualize data on fly.

GUI Components

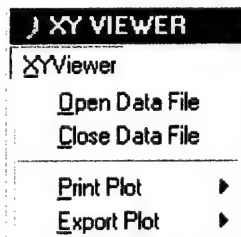This section describes several GUI components of **XYViewer** and their common use.

XY Plot Axis

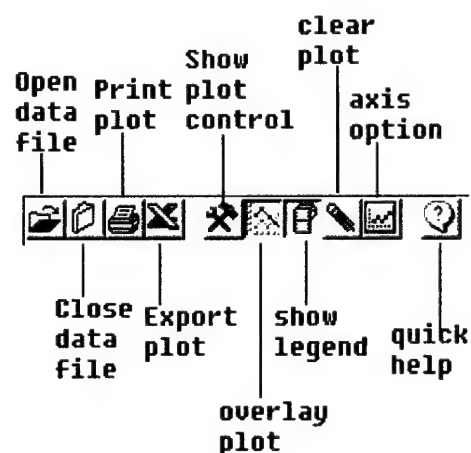**XY Plot Axis** is where the data is plotted.
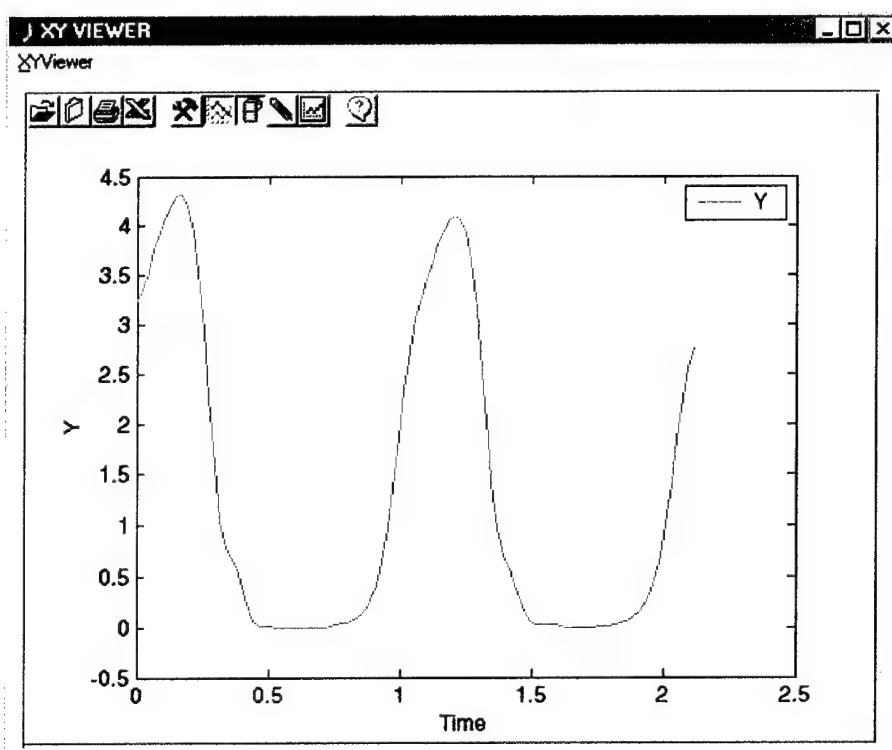
XYViewer Menu

The **XYViewer Menu** performs file operations, such as opening and closing of data files, as well as printing and exporting of a plot.
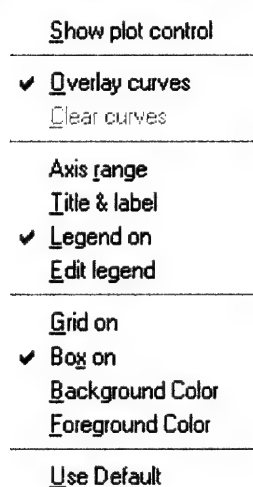

XYViewer Toolbar

**XYViewer Toolbar** provides easy access to common operations:

```
                    clear
             Show   plot
        Print plot
Open    plot  control   axis
data                    option
file
```



```
Close  Export  show    quick
data   plot    legend  help
file
           overlay
           plot
```

Axis Property Context Menu

Axis Property Context Menu is launched by right clicking mouse inside the **XY Plot Axis** but not over any curve plotted inside. It provides options to edit the properties of the axis.

```
  Show plot control

✓ Overlay curves
  Clear curves

  Axis range
  Title & label
✓ Legend on
  Edit legend

  Grid on
✓ Box on
  Background Color
  Foreground Color

  Use Default
```

Line Property Context Menu

Line Property Context Menu is activated by right clicking mouse over a curve inside the **XY Plot Axis**. It provides options to edit line properties of the curve selected.
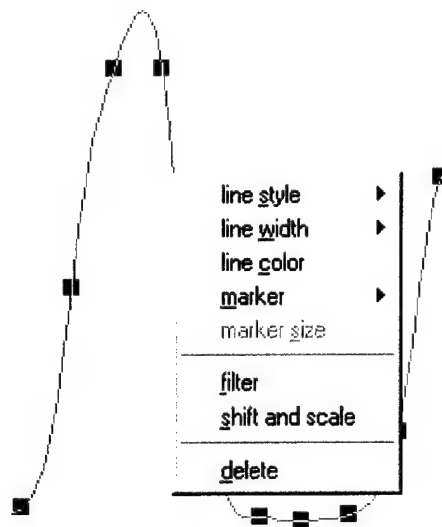
XY Plot Control

XY Plot Control is a popup window that displays the file(s) being opened and data inside a selected file. It can be used to open or close data file(s) and to plot data.
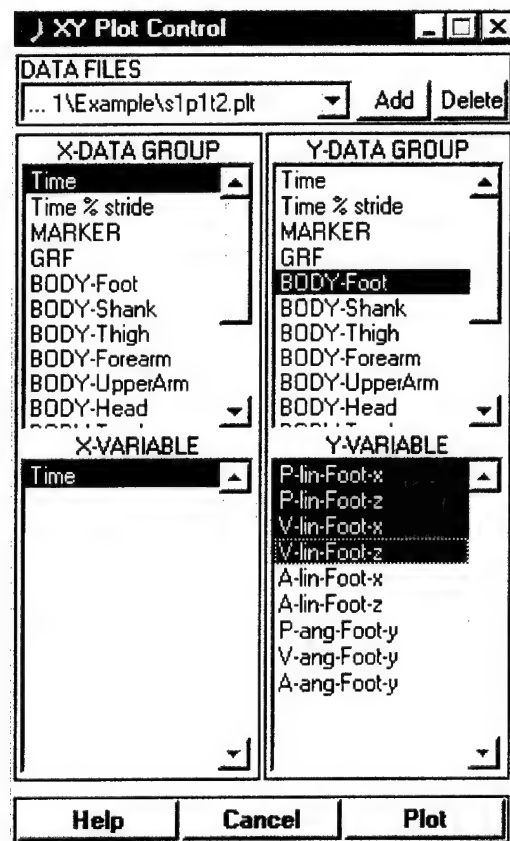
Use XY Plot Viewer

Open/Close XY Data File

To open a data file, follow the following steps

♦ Select **Open Data File** from **XYViewer Menu**;

  or push the **Open Data File** button on **XYViewer Toolbar;**

  or push the **Add** button inside **XY Plot Control**

♦ Browse for the file to open in the popup **File Browse Window**

To close a data file, follow the following steps

♦ Select **Close Data File** from **XYViewer Menu**;

  or push the **Close Data File** button on **XYViewer Toolbar;**

  or push the **Delete** button inside **XY Plot Control**

♦ Select the file(s) to close in the popup **Close XY plot data files** window and click **Remove** button to close the data file(s).
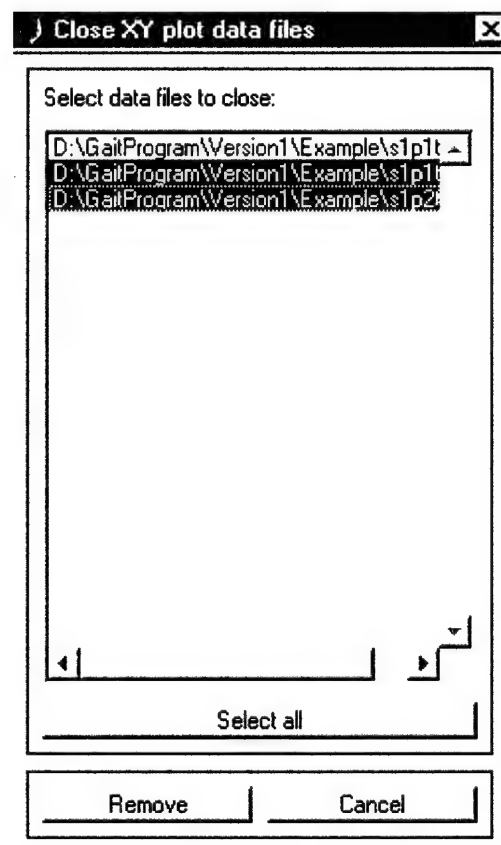
Print/Export a Plot

To print a plot on the **XY Plot Axis,** follow the following steps

♦ Select **Print Plot** from **XYViewer Menu**;

or push the **Print** button on **XYViewer Toolbar;**

♦ Select **Default Printer** to print to the default printer

♦ Select the **type of file** and enter the file name in the popup **file browser window** to print the plot as a file. Current the following types of files are supported

   ♦ Postscript files(*.ps)

   ♦ Encapsulated postscript files (*.eps)

   ♦ Window meta files (*.emf)

   ♦ Bitmap files (*.bitmap)

To export the curves plotted in the **XY Plot Axis** to an ASCII file, follow the following steps

♦ Select **Export Plot** from **XYViewer Menu**;

or push the **Export** button on **XYViewer Toolbar**;

♦ Select the **type of file** and enter the file name in the popup **file browser window** to export the data. Current the following types of files are supported

   ♦ Space/tab delimited ASCII (*.dat)

   ♦ Comma delimited ASCII files (*.csv)

   ♦ JIF ASCII files (*.jif)

Plot Data

Following the following steps to plot data

♦ Activate the **XY Plot Control**. This can be done by doing one of the following:

   ♦ Push **Show XY** button on **XYViewer Toolbar;**

   ♦ In **Axis Property Context Menu** (by right click mouse in the **XY Plot Axis**), select **Show Plot Control;**

   ♦ Push **Axis Properties** button on **XYViewer Toolbar** and select **Show Plot Control;**

♦ Select the right data file in the **Data File** popup window

♦ In **X Data Group** listbox, select the group name of X-axis variable

♦ In **X Variable** listbox, select the X-axis variable

♦ In **Y Data Group** listbox, select the group name of Y-axis variable(s)

♦ In **Y Variable** listbox, select the Y-axis variable(s)

♦ Click the **Plot** button to plot the selected Y-variable(s) vs. X-variable.

Edit Axis Properties

♦ Activate the **Axis Property Context Menu** by doing one of the following:

   ♦ Push **Axis Properties** button on **XYViewer Toolbar;**

   ♦ Right click mouse in the **XY Plot Axis**.

♦ Select one of the following properties to edit

   ♦ **Axis range**

   ♦ **Title & Label**

   ♦ **Legend on**

   ♦ **Edit legend**

   ♦ **Grid on**

   ♦ **Box on**

   ♦ **Background color**

   ♦ **Foreground color**

Edit Line Properties

♦ Activate the **Line Property Context Menu** by right clicking mouse over the curve whose properties is to be edited

♦ Select one of the following properties to edit

   ♦ **Line style**

   ♦ **Line width**

   ♦ **Line color**

   ♦ **Marker**

   ♦ **Marker size**

Show/Hide Legend

The legend for the curves plotted can be displayed or removed from **XY Plot axis** by one of the following

♦ Push **Legend on/off** button on **XYViewer Toolbar;**

♦ Or select **Legend on/off** in **Axis Property Context Menu** (by right click mouse in the **XY Plot Axis**)

Enable/Disable Overlaying Plots

Overlaying plot can be enabled or disabled by one of the following

♦ Push **Overlay curve** button on **XYViewer Toolbar;**

♦ Or select **Overlay curves** in **Axis Property Context Menu** (by right click mouse in the **XY Plot Axis**)

Clear a Plot or Delete a Curve

One of the following will clear the plot

♦ Push **Clear** button on **XYViewer Toolbar;**

♦ Or select **Clear curves** in **Axis Property Context Menu** (by right click mouse in the **XY Plot Axis**)

To delete only one curve from the plot, follow the following steps

♦ Activate the **Line Property Context Menu** by right clicking mouse over the curve whose properties is to be deleted

♦ Select **Delete**

Get Quick Help

To get quick help and information about **XYViewer,**

♦ Push **Help** button on **XYViewer Toolbar;**

♦ Select a topic to display the help message about the topic

5. Stick Plot Viewer

About StickViewer

What is Stick plot viewer

**StickViewer** is a three-dimensional viewer to visualize stick plots.

Features

- Simple GUI provides easy access to visualization and animation
- Support printing the plot as PS, EPS, EMF, and BITMAP files;
- Support outputing stick animations as Matlab movies;
- Many axis properties, such as color, grid, box, legend, axis label, title, can be edited;
- Many stick properties ,such as style, width, color, marker and marker size, can be edited;
- Automatically synchronized with **XYViewer** to visualize data on fly.

GUI Components

This section describes several GUI components of **StickViewer** and their common use.

Stick Plot Axis

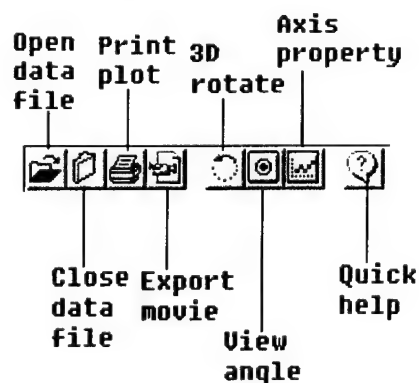**Stick Plot Axis** is where the data is plotted.
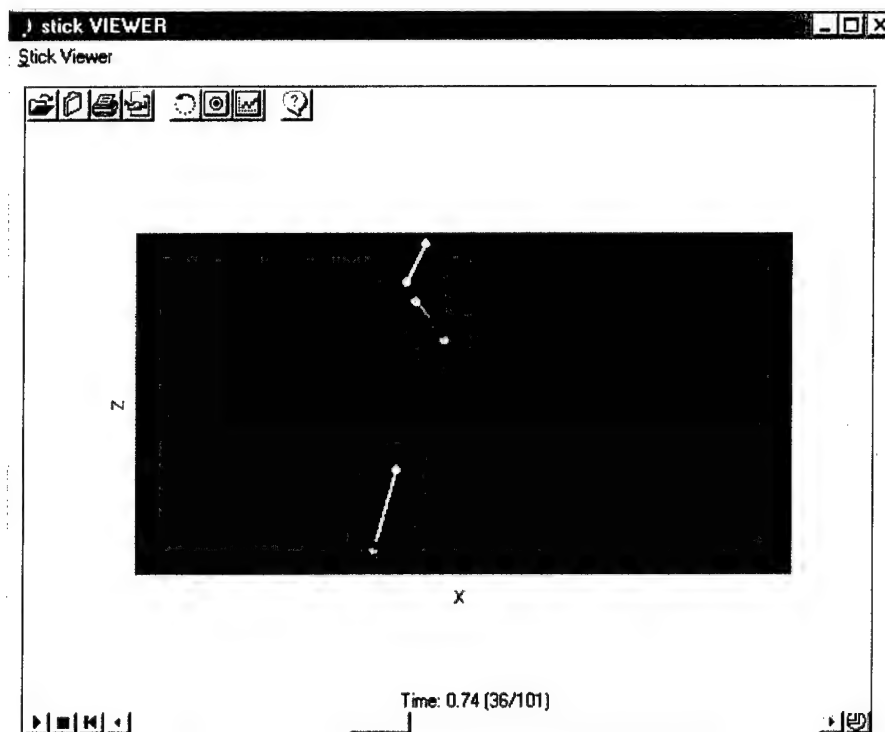
StickViewer Menu

The **StickViewer Menu** performs file operations, such as opening and closing of data files, as well as printing plot and exporting animation.
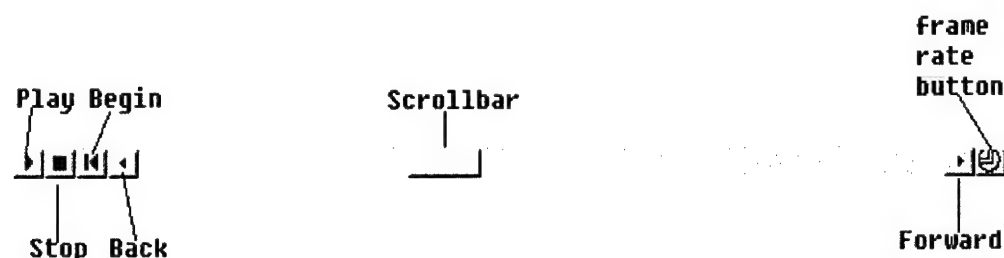

StickViewer Toolbar

**StickViewer Toolbar** provides easy access to common operations:

Stick Animation Toolbar

Stick Animation Toolbar provides options to control the animation of stick plots.

Axis Property Context Menu

Axis Property Context Menu is launched by right clicking mouse inside the **Stick Plot Axis** but not over any stick. It provides options to edit the properties of the axis.
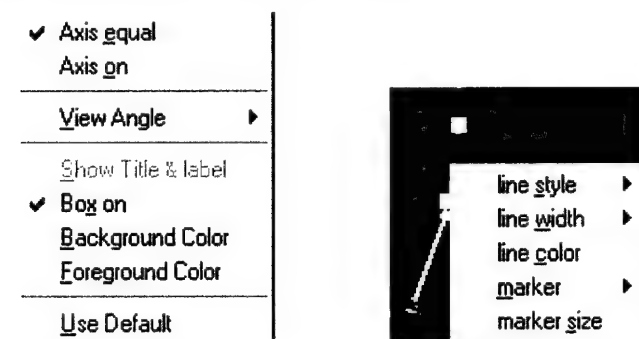
Stick Property Context Menu

Stick Property Context Menu is activated by right clicking mouse over a stick inside the **Stick Plot Axis**. It provides options to edit line properties of the stick selected.

5-3

Use STICK Plot Viewer

Open/Close Stick Graphics File

To open a data file, follow the following steps

♦ Select **Open Stick Graphics File** from **StickViewer Menu**;

or push the **Open** button on **StickViewer Toolbar**;

♦ Browse for the file to open in the popup **File Browse Window**

♦ The first frame of the stick plots will be displayed

To close a stick graphics file, follow the following steps

♦ Select **Close Stick Graphics File** from **StickViewer Menu**;

or push the Close button on StickViewer Toolbar;

Note: Stick graphic file is a Matlab binary data file containing the time history of positions and orientations of each stick, as well as the definition of each stick

Print a Frame

To print a snapshot of a stick plot frame the following steps

♦ Select **Print Plot** from **StickViewer Menu**;

or push the **Print** button on **StickViewer Toolbar**;

♦ Select **Default Printer** to print the snapshot to the default printer

♦ Select the **type of file** and enter the file name in the popup **file browser window** to print the snapshot as a file. Currently the following types of files are supported

　♦ Postscript files(*.ps)

　♦ Encapsulated postscript files (*.eps)

　♦ Window meta files (*.emf)

　♦ Bitmap files (*.bitmap)

Export an Animation

To export a stick animation, following the following steps

♦ Select **Export Movie** from **StickViewer Menu**;

or push the **Expor**t button on **StickViewer Toolbar**;

♦ Select the **type of file** and enter the file name in the popup **file browser window** to export the data. Currently only Matlab movie (*.mat) is supported

Note: To convert a Matlab movie file into an AVI file, use *"movie2avi"* command in Matlab

Edit Axis Properties

♦ Activate the **Axis Property Context Menu** by doing one of the following:

  ♦ Push **Axis Properties** button on **StickViewer Toolbar;**

  ♦ Right click mouse in the **Stick Plot Axis**.

♦ Select one of the following properties to edit

  ♦ **Axis equal:** force all axes to use the same data aspect ratio for

  ♦ **Axis on:** turn on or turn off axis

  ♦ **View angle:** change the view angle of the 3D stick plots

  ♦ **Show Title & lable:** show label for the axes

  ♦ **Box on:** add or remove box from the axis

  ♦ **Background color:** change background of the axis

  ♦ **Foreground color:** change foreground of the axis

Edit Stick Properties

♦ Activate the **Stick Property Context Menu** by right clicking mouse over the stick whose properties is to be edited

♦ Select one of the following properties to edit

  ♦ **Line style**

  ♦ **Line width**

  ♦ **Line color**

  ♦ **Marker**

  ♦ **Marker size**

Free rotation of Axis

The free rotation of the axis (to change view angle) can be performed by pushing down the **3D rotate** button on **StickViewer Toolbar** and use mouse to rotate the **Stick Plot Axis.**

Get Quick Help

To get quick help and information about **StickViewer,**

♦ Push **Help** button on **StickViewer Toolbar;**

♦ Select a topic to display the help message about the topic

6. Example

Files need for the example problem

During installation, Gait3D_v1 creates an *Example* directory under the directory where Gait3D_v1 is installed (*$gait3dpath*). There are four subdirectories under the *Example* directory.

♦ InputData: contains input motion data files and force plate data files

♦ OldOutput: contains result files from the previous USARIEM gait program

♦ TestProject: is an empty directory where example project will be built

♦ Calibrate: contains some matlab routines to compare the result of Gait3D_v1 with the previous gait program

Create a new project

♦ Start Gait3D_v1

♦ Select New Project from Project Menu

♦ Browse in the popup window to directory *$gait3dpath/Example/TestProject* and enter project name as **Sample**

♦ A new project Sample.proj is created and Gait3D_v1 automatically switch to the **Project and Test Editing Panels**

Note: *Sample.msg* and *test.default* are also created in the directory

Setup test default setting

♦ Click Default button in the Project Editing Panel

♦ Click subsequently **Options for preprocessing** button, **Parameters** button, and **Advanced option** button in the **Test Editing Panel** and change the values to the desired default values. In this example, change the parameters to 64.3 (kg), 13.2 (kg), 1.667 (m), 0.336 (m) and 0.376 (m) and leave all other variables unchanged.

♦ Click **Update Default** button in the **Test Editing Panel**

Add tests to the project

♦ Click Add button in the Project Editing Panel

♦ Browse in the popup window to directory *$gait3dpath/Example/InputData* and select *S1p1t1.vid*

- Click **Save** button in the **Test Editing Panel**

- A new test named *S1p1t1* is added to the sample project

- Repeat the step to add more tests (*S1p1t2*, *S1p2t1*) into the project.

Run the project

- Save the project by clicking **Save** button in the **Project Editing Panel**. *Sample.proj* is created in the project directory.

- Click **Analyze** icon in the **Toolbar** to start running the project

- Gait3D_v1 will switches to **Message View** and pops up a **Status dialog**, indicating the progress if the analysis.

- After the analysis is complete, a number of files will be created in the project directory, including

  - *Sample.output*: an ASCII file recording details of the analysis

  - Three result files for each test, i.e., *S1p1t1.grf*, *S1p1t1.pltf*, *S1p1t1.gra* etc.

Look into Result using XYviewer and StickViewer

- Click on **XYViewer** icon in the **Toolbar** to activate XYViewer

- Click on **StickViewer** icon in the **Toolbar** to also activate StickViewer

- Click the **Open** icon in the **XYViewer**

- Browse in the popup window to directory *$gait3dpath/Example/TestProject* and select *S1p1t1.plt*

- Click the **Open** icon in the **StickViewer**

- Browse in the popup window to directory *$gait3dpath/Example/TestProject* and select *S1p1t1.gra*